

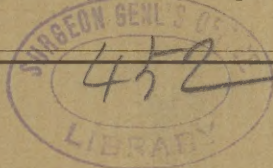
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THE TREATMENT
OF
CROUPOUS PNEUMONIA
IN CHILDREN.

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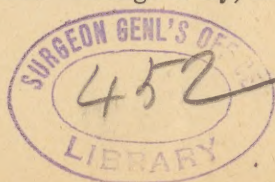


THE TREATMENT OF CROUPOUS PNEUMONIA IN CHILDREN.

A WELL-ESTABLISHED opinion is now held among the best authorities in pediatrics that simple primary croupous pneumonia in children is a disease that ends ordinarily in recovery. This opinion is deduced from a large experience with many kinds of treatment of the disease, as it occurs both in adults and children. At first and for many years regarded as a local inflammatory process, it was after a time suspected that the disease was a self-limited one, running a definite course. This in turn suggested the idea that it was of infectious origin. The conception of the theory that the disease was of such a nature at once led to the adoption of an expectant plan of treatment. This is at the present day the generally-accepted view of the case.

The fact remains, however, that, in our climate, simple primary croupous pneumonia in children is a disease that becomes in certain years, when an epidemic influence, or medical constitution, according to Trousseau, is prevailing, a severe and often fatal one. I therefore propose in this paper to consider what are the true therapeutic indications in this disease as occurring in children.

The generally accepted opinion of the medical profession as to the element of danger in pneumonia is the tendency to *cardiac exhaustion*, or *heart-failure*. In order to guard against this danger it is of the highest importance to understand how such a condition is brought about. Strange to say, for a long



time the high temperature, often attending the disease, was regarded as the principal factor in producing cardiac exhaustion through its degenerative action upon the cardiac muscle. It was not until the appearance of the excellent paper of Dr. A. H. Smith, of this city, entitled, "Some Considerations in Regard to Acute Obstructive Diseases of the Lungs," read before the Berlin Medical Congress in 1890, that attention was called to the important part played by the engorged condition of the diseased lung in producing cardiac exhaustion. Moreover, it was shown that the *right heart* and not the heart as a whole was the main source of exhaustion, and that it was far safer to watch the pulmonary second sound of the heart than the pulse, as a danger signal of this condition.

Acting upon this hint, let us inquire what are the disturbances of circulation produced by the pathological process in croupous pneumonia. Owing to the obstructed circulation in the engorged lung, the blood-vessels of which are in a state of permanent dilatation, the right-heart becomes overcrowded. The small blood-vessels of the general circulation are in a state of excessive contraction, due to the action of the disease-poison upon the vaso-motor centres, and to an effort at physiological compensation for the undue blood-supply to the diseased lung. The increased arterial tension of the systemic circulation compels the left-heart, in consequence, to exert greater force and more rapid action to propel the blood through the narrowed arterioles. The return flow of venous blood to the right heart is hastened, but the obstruction in the pulmonary circulation hardly permits the right ventricle to completely empty itself, before it is filled by the venous return flow. Hence dilatation of the right ventricle, without compensatory hypertrophy occurs. In addition, the cardiac contractions as a whole are hastened by the action of the left side, as before explained, and without the complicating influence of any degenerative changes that are likely to be caused by the high temperature upon the cardiac muscular fibre, exhaustion will inevitably occur if the disease-action continues too long, or the area of lung involved becomes too extensive. These conditions of the disease exist in children as well as in adults, with this advantage, that in the child, unless previously in-

fluenced by some debilitating disturbance of health, the heart is in better condition to withstand the shock and strain of the disturbed circulation, because there is not that degenerative change of tissue apt to be already present that is so frequently incidental to adult life. This fact will go far towards explaining the statement made in the first sentence of this paper, that primary croupous pneumonia in children usually ends in recovery.

If these conditions are the correct interpretation of the tendency to cardiac failure in croupous pneumonia, as in my opinion they are, our guide for therapeutic aid and interference is made much clearer. It has been taught that croupous pneumonia, from a pathological stand-point, is a disease of the circulation. Certainly the main danger to life is one arising from the circulation, hence our main effort at interference should be directed towards correcting this mechanism. If other influences, such as the effect of the morbidic poison circulating in the blood and acting upon the nerve-centres controlling the heart's action, be present, they should also be taken into consideration in the employment of our therapeutics.

Knowing that the natural course of the disease, especially in children, is usually to recovery, the great temptation to overtreatment must be strenuously avoided. But the question naturally arises, when shall the proper remedies be used and what are the special indications for their employment. The character and frequency of the pulse, the temperature, the relation of the frequency of pulse to the height of temperature, the character of the pulmonary second sound of the heart, and the general condition of the patient have all to be taken together into consideration. No single one of these symptoms alone is sufficient to warrant a hap-hazard application of remedies, the diagnosis having been definitely determined. Hence I think it will be found that the greatest success will attend the rule to treat each case of croupous pneumonia individually.

When the pulse runs over 160, with a temperature from 104° F. to 105° F. at the onset of the disease, the case may be regarded as serious in character, although Loomis does not look upon the frequency of the pulse in children as of much importance.

The height of the temperature alone, at the onset of the disease, does not in my experience invariably indicate an unfavorable termination, or lead to heart-failure, as I have seen a boy of ten years of age with a temperature on the first day of 107° F. recover. A high temperature may, however, in some children lead to convulsions, as I have before stated in a paper read before the Pediatric Section of the American Medical Association in 1890, on "The Therapeutic Value of Antipyrin in some Diseases of Children."

A condition of apathy, with inability to hold up the head in the early stage of the disease, may be regarded as of unfavorable significance. The amount of albumen present in the urine during the first three days of the disease is regarded by Dr. Soltau Fenwick, in a recent paper published in the *Lancet*, based on an analysis of the treatment of one thousand cases of croupous pneumonia, as having a definite relation to the mortality. In cases where the urine contained one-fourth albumen, thirty-two per cent. died, where one-third albumen, fifty-two per cent. died, and where one-half, eighty-six per cent. died. The extent of lung-tissue involved is regarded by some authorities as bearing no relation to the danger of heart-failure, though it is certainly a well-recognized fact that when both lungs are involved few cases recover.

As a general rule to be observed in the management of primary croupous pneumonia in children, our therapeutic efforts should be to interfere as little as possible, but rather to *assist* nature after the manner she selects for favorably terminating the disease-process. As we all know, this occurs, as a rule, suddenly, and is attended with profuse perspiration, which is undoubtedly caused by a sudden return of blood from the engorged lungs to the cutaneous blood-vessels, thereby stimulating the sweat-glands inordinately. Hence I believe that the better and safer course is to employ such simple diaphoretics as the spirits of Mindererus or the liquor ammoniæ acetatis, the spirits of nitrous ether, which being a nitrite is consequently a dilator of the contracted arterioles, the combination of opium and ipecac or Dover's powder, which can be used in the liquid form as a syrup, or even the homely domestic boneset-tea, which is undoubtedly a reliable diaphoretic.

In the more serious cases the warm bath at 95° F., with active friction of the skin of the entire body, or sponging with water at 116° F., systematically and diligently employed, is now becoming popular with many large observers in the treatment of croupous pneumonia, because, on account of its undoubted diaphoretic action, through the function of the skin being increased by dilatation of the cutaneous blood-vessels, and the promotion of radiation of heat through evaporation of moisture, it is found to reduce temperature and to strengthen the heart. Fenwick found that hot sponging reduced temperature and lessened mortality better than quinine and the newer antipyretics, such as antipyrin and phenacetin, while in those cases of the sthenic form of the disease that were stubborn to the reduction of temperature by the employment of cold air alone, after the manner of a special device called the "ice-cradle,"* the previous employment of hot-sponging gave better results than the cold-air treatment. This can be easily explained upon the ground that, diaphoresis being once established by the hot sponging, a high degree of radiation of heat and cooling of blood flowing to the surface of the body was maintained by the cold air. The application of the "ice-cradle" was intermitted whenever there was a fall of temperature below 100° F. The best results in the severest cases were obtained in this way, the mortality being only seven per cent. in forty-three cases treated. The "diaphoretic pack" may also be employed, as suggested by Dr. Percy Wilde (see article on "Thermotherapeutics," *International Medical Annual*, 1890, pp. 64, 77). In this connection it is with much pleasure that

* The ice-cradle consists of an iron surgical cradle, from the central bar of which are suspended several small zinc pails half-filled with ice. The patient lies undressed, or covered with a light gauze sheet, upon the bed, and the cradle, covered with a light counterpane, is placed over him. In order to prevent any feeling of chilliness, a hot-water bottle is kept in contact with the patient's feet. The ice in the pails is renewed at intervals, precaution being taken to cover the bottom of the pails with a piece of lint in order to prevent any condensed moisture from dripping upon the body of the patient. The free circulation of air through the cradle is a *sine qua non*. The patient's temperature is taken every three or four hours, and the cradle removed when the mercury has fallen below 100° F., or the patient shows inclination to shiver. When the body temperature rises again to 103° F., the cradle is reapplied.

I am enabled to refer to editorial articles, by Dr. S. Baruch in the March and April numbers of the *Dietetic Gazette*, explanatory of the beneficial action of the warm or cool bath in aiding to divert the circulation to the cutaneous surface, and thereby relieve the overtaxed right heart, in the treatment of croupous pneumonia. Dr. Baruch makes an important point in the use of these baths, to practise *constant friction*, as it serves to restore tone to the small blood-vessels.

By the production of diaphoresis an opportunity is certainly afforded to relieve the congested condition of the diseased lung by inviting more blood into the dilated cutaneous vessels; at the same time an effort is made to eliminate some of the morbid poison circulating in the blood.

Acting upon these lines of rational physiological therapeutics, still more blood may be diverted from the venous system by a gentle stimulation of the hepatic function. The liver and its collateral circulation can be induced to contain a large volume of blood, and so act as a compensating reservoir, so to speak, for the vascular mechanism. Moreover, in receiving an increased blood-supply the various physiological functions of the liver are exaggerated, not the least important one of which is the destruction of the poisonous products, or ptomaines, generated in the system. This fact is well set forth by Brunton in his valuable work on therapeutics, and too much stress, in my judgment, cannot be laid upon this point.

By the moderate use of calomel in the form of a tablet triturate of one-tenth grain, given every hour for six doses, on the first day and thereafter every three or four hours daily, according to its effect upon the bowels, a positive stimulation of the hepatic function will be obtained, by which I believe nothing but the very best effects will be secured in the treatment of croupous pneumonia in children. The idea of obtaining any action upon the pathological process in the lung by increasing the absorption of the plastic exudation should be reverently laid aside, for this is not the object to be desired. It will be fully sufficient to relieve the engorged lung and venous system, and possibly cause some destruction of the disease-poison, by attempting to induce an increased flow of blood to a large receiving organ such as the liver. In this connection

the diuretic action of small doses of calomel should not be overlooked. The kidney may become an important agent in the elimination of the fever products, and the morbid poison.

A drug that has its admirers as well as opponents in the treatment of croupous pneumonia, especially when occurring in children, is *aconite*. Many practitioners are afraid of it on account of its reputation as a cardiac depressant. But when administered in half-drop or drop doses at the onset of the disease, and repeated hourly while the patient is awake, the effect must be therapeutically the exact contrary, as it slows the frequent pulse, thereby prolonging the diastole of the heart, and so giving that overworked organ time to regain nutrition and force. It is also believed by some to act primarily on the respiratory centres; but be that as it may, it certainly induces perspiration through dilatation of the cutaneous blood-vessels, and reduces temperature; but whether the latter is a result of radiation and evaporation of the perspiration is a disputed point. In my hands good results, as a rule, have always followed its administration.

The object of this paper would be incomplete if I failed to mention the employment of *digitalis* in the treatment of croupous pneumonia, which I do *only to condemn it*. So far as I can see, there is not a single therapeutic indication for its use on physiological grounds. It is probably employed more than any other drug at the present day to prevent heart-failure in croupous pneumonia, but, as I consider, upon entirely false principles. Dr. Smith, in the article before referred to, says, "Digitalis seems to be clearly contraindicated by its tendency to diminish the vascular area. Its action is to empty the arteries into the veins, whereas our efforts should be to empty the veins into the arteries. Its administration proceeds upon the wrong assumption that the heart as a whole, and not the right heart alone, is in danger of exhaustion. It cannot restore contractility to the paralyzed vessels of the affected part; on the contrary, it serves only to distend them more by increasing the tension in the unaffected vessels with which they communicate. The energy it imparts to the heart is in proportion to the muscular tissue acted upon, and, therefore, is twice as great on the left side as on the right. But the left

heart has already an undue advantage over its fellow, and only harm can come from further increasing the unequilibrium." Professor Loomis says, "Digitalis is very uncertain in its action in the heart-insufficiency of pneumonia, and has seemed to more frequently do harm than good. The nervous element of the heart-failure contraindicates its use." Fenwick, in his article referred to, also shows from its use in forty-three cases with nineteen deaths that its value to prevent heart-failure in pneumonia is of very little importance.

I should like to utter a word of warning concerning one other remedy that has always been popular in the treatment of croupous pneumonia. I refer to carbonate of ammonia. Upon what grounds its popularity in this disease rests it would be difficult to say, unless about the period of crisis its use proves beneficial as a prompt diffusible stimulant to the entire circulation, when administered in full doses for a short period of time. If there is any indication at all for its employment in croupous pneumonia, it is at such a time only. I confess that I am prejudiced against the use of carbonate of ammonia in the croupous pneumonia of children, and find that I am not alone in my opinion. Eustace Smith regards its use as dangerous in the early stage of the disease, the stimulating expectorant action of the drug tending to convert an otherwise favorable case into a fatal one. Professor Loomis says, "It has been claimed that carbonate of ammonia in large doses, in adults, stimulates the heart and prevents the formation of heart-clots by its action on the blood. The cause of heart-clots is the heart-failure, and there is no evidence that carbonate of ammonia prevents the coagulation of the blood when the blood-current is slowed. Besides, large doses of carbonate of ammonia irritate the stomach, and on this account interfere with nutrition and thus diminish the chances to recovery."

In regard to local treatment in croupous pneumonia in children, the use of the warm poultice, though a relic of the view that the disease is one of a local origin, has, nevertheless, served a most useful purpose on the principle that it aids diaphoresis by its combined warmth and moisture. The employment of the warm wet binder, after the plan suggested by Henoeh, is, however, far neater and less disturbing to the little patient,

while it is equally as effective. A soft napkin or large diaper is wrung out with hot water and applied around the chest below the axilla. This is kept moist by pouring on warm water from time to time, without removal of the cloths, care being taken to use only enough to keep them moist. A piece of oil-silk laid outside of the binder will serve to retain the warmth and prevent the bedclothes from becoming wet.

Fenwick says that in the London Hospital the ice-bag applied for an hour or so at a time to the affected side, after the manner suggested by Dr. Lees, has taken the place of the use of the poultice. It reduces temperature, though in reality it is employed more for the purpose of strengthening the heart. The duration and frequency of its application is guided by the fall of temperature. Brunton says that in the treatment of croupous pneumonia in children it must be used with great care, as collapse is often produced.

In the consideration of the various treatments of croupous pneumonia, suggested by different authorities, I think the conclusion may be deduced, that the most successful methods apply to the principle of *dilatation of the cutaneous blood-vessels and the effort to maintain this condition*, thereby producing diaphoresis and at the same time reducing the temperature. This is the most rational and surest manner of relieving the overcrowded heart, and in consequence guarding against the tendency to dilatation of the right heart and subsequent paralysis of that organ. If the morbid poison is to be regarded as an important factor in the production of cardiac-failure, by its action upon the nerve centres, as in all probability it may be, then there is no better plan that I can conceive of than to aid in its elimination through the emunctories of the skin and its destruction by the physiological function of the liver.



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